BOOK REVIEWS

Advances in Plasma Physics, Vol. 2

Edited by A Simon and W. B. Thompson, *Interscience Publishers*, 1969; pp–vii+211.

The present volume consists of the following three articles :

1) Cesium Plasma Research—by N. D'Angelo.

2) Wave Phenomena in the Interstellar Plasma—by I Lerche.

3) Shock Waves in Plasma Physics—by C K. Chu and Robert A. Gross

There has been an increasing tendency over the last few years for a detailed study of the physical phenomena occurring in a quiescent plasma, as the study is expected to lead to an understanding of the more complicated processes inherent in the plasma of a thermonuclear reactor One type of such quiescent plasma has been reviewed in the first article, which presents some of the plasma devices as well as the plasma properties in the presence of a magnetic field. Various aspects of the plasma, such as confinement by magnetic fields of different configurations, presence of negative ions, etc. are considered. Although the treatment in certain sections is somewhat sketchy, the relevant references would be of much help to the interested readers. An interesting feature is provided by the speculation on the type of cesium plasma experiments which are likely to be carried out in the near future

The second article, though the longest one of the volume, is rather restricted in its scope, dealing essentially with a few selected aspects of small amplitude perturbations in the interstellar medium (the composition of which has been described at the outset) by way of comparatively simple model situations However, the treatment in the limited sphere is quite exhaustive and will surely be helpful to initiate one into the basic hydromagnetics and plasma particle phenomena associated with the subject of astrophysics. It is worth pointing out that the controversial topic of the thermodynamically paradoxical supraluminous waves have been discussed here in detail.

The last article is perhaps the most exciting, as its topic ranges from laboratory shocks to supernova explosions and is, at the same time, intimately connected with thermonuclear research It starts with a brief introduction to shock waves and gas dynamic shocks including detonation waves. Shock waves in plasma are then presented under the following three headings.

a) Shock waves in fully ionized plasma—A very interesting item here is the discussion on the so-called collisionless shocks. This discussion is preceded by a single-fluid description of MHD shocks and a multi-fluid description of collisional shocks.

b) Ionizing shock waves—This study is carried out in the presence of a magnetic field perpendicular, parallel or oblique to the plane of the shock.

c) High energy shock waves—This covers very strong shock waves namely, thermo-nuclear detonation waves, radiative shocks and shock waves at relativistic speeds; a few examples of astrophysical shock waves are also included.

In conclusion, plasma physicists owe their thanks to the editors for compiling the recent knowledge in a few branches of plasma physics; it is expected that they would add further volumes to this series.

J. B.

Springer Tracts in Modern Physics

Vol. 49, *Springer-Verlag, Berlin*, 1969.

1) *Electron Scattering, Photo-excitation and Nuclear Models*—H. Liberall

Electrons and photons are important tools of investigation of nuclear structure. In this article the author reviews some aspects of the theory of interaction of these particles with nuclei. A brief discussion of the basic mathematical formalism of electron-nuclear interaction is followed by a review of the theories of photoexcitation of the remarkable giant resonance states as well as of states below the giant resonance. For the giant resonance states, the author has given a detailed description of the early Goldhaber-Teller and Steinwedel-Jensen hydrodynamical models and their later extensions. However in contrast the more basic microscopic theory of these states is discussed rather briefly and recent developments, like the continuum shell model theories, find no mention at all.

B. B

2) *Baryon Current Solving SU (3) Charge Current Algebra*—H. Kleinert

The author deals with an attempt to describe the whole of the baryonic spectrum using the local commutation relations of the SU(3) currents at infinite momotum. The approach is partly semiempirical The mass spectrum of the baryons as well as their electromagnetic form factors are fitted. Apart from the necessity of the notorious space-like states, the agreement with experiment is claimed to be sufficiently good.

G. R

Thermal Physics

C. Kittel, *John Wiley and Sons. Inc., New York* pp. 418 — $ 10.95

This book makes a refreshingly new approach to thermal physics, i.e. thermodynamics and statistical mechanics. The classical method which has till now been used, in general, leads quickly to the ideal gas laws and expression for the heat capacity of an ideal gas. This advantage is more than off-set by the difficulty in obtaining correct expression for the entropy which is the most important quantity in thermal physics.

In this book, Gibb's approach has been used and the subject matter has been built up from a consistent quantum view point in which the states of the entire system have been considered. In this approach the quantum distribution law are easily derived which in the limit pass to the classical distribution laws to yield expressions for the entropy, gas laws, etc.

Many important applications of thermal physics to the different problems in physics, chemistry, engineering, biology and astrophysics have been given. The more important amongst them are the following : (i) applications of the Fermi-Dirac and Bose-Einstein distribution laws in interpreting various physical phenomena (ii) magnetic properties of solids.

The exposition of the subject matter is clear and the reader is lead step by step to the more advanced topics. The approach used in this book should be used for teaching thermal physics to our students of B.Sc. (Hons.) in Physics.

A. K. B.